

REMARKS

Claims 1-25 are pending in this application. By this Amendment, claims 1 and 11 are amended. Support for the amendments to claims 1 and 11 can be found in the specification as originally filed, for example, at paragraphs [0015], [0023], [0025] and [0034] and in Example 1 (paragraphs [0038]-[0041]), and in claims 1 and 11 as originally filed. Thus, no new matter is added by the amendments. In view of the foregoing amendments and the following remarks, reconsideration and allowance are respectfully requested.

I. Rejections Under 35 U.S.C. §102**A. Horiuchi**

The Office Action rejects claims 1-3, 5-13, 15-18 and 21-25 under 35 U.S.C. §102(b) over U.S. Patent No. 5,610,117 to Horiuchi et al. Applicants respectfully traverse this rejection.

Independent claim 1 sets forth a "catalyst for purifying an exhaust gas, comprising: zirconia particles; and a transition metal layer in which at least part of a transition metal is solved into said zirconia particles and which covers at least a part of a surface of said zirconia particles in a lamellar manner; wherein at least a part of said transition metal is solved into zirconia." Claims 2-10 depend, directly or indirectly, from claim 1 and include all of the limitations thereof. Independent claim 11 similarly sets forth a "catalyst for purifying an exhaust gas, comprising: a co-catalyst powder including zirconia particles, and a transition metal layer which at least a part of a transition metal is solved into said zirconia particles and which covers at least a part of a surface of said zirconia particles in a lamellar manner; and at least one member selected from the group consisting of a titania powder and a zeolite powder; wherein at least a part of said transition metal is solved into zirconia." Claims 12-25 depend, directly or indirectly, from claim 11 and include all of the limitations thereof.

Horiuchi is cited as disclosing a catalyst composition useful for diesel exhaust gas purification, including a catalytic component comprising iron, manganese and a refractory inorganic oxide such as zirconia, and an additional catalytic component comprising a noble metal and a refractory inorganic oxide such as titania. *See* Horiuchi, col. 2, lines 59-67; col. 5, lines 54-58. Horiuchi does not anticipate the claimed invention, at least because Horiuchi does not disclose that at least a part of the transition metal is solved into zirconia.

Calcination is generally understood in the art to entail heating in an atmosphere of air. However, as discussed in the instant specification, forming a transition metal layer by loading a transition metal salt on zirconia particles and calcining the particles at 800°C or more in an inert or oxidizing gas atmosphere results in the transition metal partially solving into the zirconia or forming a composite oxide with it. *See* Specification, paragraph [0034]. That is, in order to prepare catalysts as set forth in claims 1 and 11, the catalyst mixture is calcined at 800°C or more in an inert or oxidizing gas atmosphere.

Horiuchi describes calcining a catalyst at a temperature of 300-850°C, with the preferred calcination temperature range being 400-600°C. *See* Horiuchi, col. 7, lines 60-61. In particular, the disclosed Examples of Horiuchi are calcined at temperatures of 400-700°C. *See* Horiuchi, col. 8, line 14 – col. 13, line 10. However, Horiuchi does not disclose any particular atmosphere in which calcinations is conducted; thus, Horiuchi is understood as teaching calcination in air, rather than in a specific atmosphere such as an inert or oxidizing atmosphere. *See* generally, Horiuchi. Horiuchi does not disclose specific embodiments of a catalyst calcined at a temperature of 800°C or more in an inert or oxidizing gas atmosphere. *See* Horiuchi, col. 8, line 14 – col. 13, line 10.

Further, as can be seen in Comparative Example 1 of the instant specification – which includes the same catalyst mixture as and corresponds to Example 1 of Horiuchi, alternative

methods, such as calcining at 500°C in air, do not result in the transition metal being solved into zirconia. *See* Specification, paragraphs [0046]-[0056]; Horiuchi, col. 8, lines 14-43.

Thus, Applicants respectfully submit that Horiuchi does not disclose, either explicitly or inherently, a catalyst comprising: zirconia particles and a transition metal layer in which at least part of a transition metal is solved into zirconia, as recited in independent claims 1 and 11.

Moreover, Horiuchi does not disclose the beneficial effects that can be obtained by the catalytic compositions set forth in claims 1 and 11. For example, when a part of the transition metal is solved into the zirconia, the oxidizing activity of the transition metal is suppressed. *See* Specification, paragraphs [0023], [0025], [0034]. By suppressing the oxidizing activity of the transition metal, the oxidation of SO₂, and the generation of sulfates, can be inhibited. *See* Specification, paragraph [0023], [0025], [0034]. In addition, HC and SOF purifying rates can be improved, and particulate materials can be efficiently purified. *See* Specification, paragraph [0024].

For at least the above reasons, Applicants respectfully submit that independent claims 1 and 11, and their respective dependent claims 2, 3, 5-10, 12, 13, 15-18 and 21-25 are patentable over Horiuchi. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

B. Montreuil

The Office Action rejects claims 1-3, 7, 8, 11-13, 15, 19, 20 and 21-23 under 35 U.S.C. §102(b) over U.S. Patent No. 5,155,077 to Montreuil et al. Applicants respectfully traverse this rejection.

Independent claims 1 and 11 are as set forth above. Montreuil does not anticipate the claimed invention for the same reasons as Horiuchi.

Montreuil discloses a catalyst composition useful for exhaust gas purification, including zirconia and a transition metal. *See* Montreuil, col. 2, lines 27-44. Montreuil also describes calcining its catalyst at a temperature of 300-600°C. *See* Montreuil, col. 2, lines 51-53. In particular, the disclosed Example of Montreuil is calcined at a temperature of 600°C. *See* Montreuil, col. 3, lines 57-58. However, Montreuil does not disclose any particular atmosphere in which calcinations is conducted; thus, Montreuil is understood as teaching calcination in air, rather than in a specific atmosphere such as an inert or oxidizing atmosphere, as discussed above. *See* generally, Montreuil. Montreuil does not disclose specific embodiments of a catalyst calcined at a temperature of 800°C or more in an inert or oxidizing gas atmosphere, and thus does not disclose, in discrete embodiments, a catalyst comprising: zirconia particles and a transition metal layer in which at least part of a transition metal is solved into said zirconia particles, as recited in independent claims 1 and 11. *See* generally, Montreuil.

Moreover, Montreuil, like Horiuchi, does not disclose the beneficial effects that can be obtained by the catalytic compositions set forth in claims 1 and 11.

For at least the above reasons, Applicants respectfully submit that independent claims 1 and 11, and their respective dependent claims 2, 3, 7, 8, 12, 13, 15, 19, 20 and 21-23 are patentable over Montreuil. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

C. Seshan

The Office Action rejects claims 1-10 under 35 U.S.C. §102(b) over U.S. Patent No. 5,989,457 to Seshan et al. Applicants respectfully traverse this rejection.

Independent claim 1 is as set forth above. Seshan does not anticipate the claimed invention for the same reasons described above.

Seshan discloses a catalyst composition, including zirconia and a transition metal, useful for production of carbon monoxide and hydrogen gases from carbon dioxide and methane gases. *See* Seshan, col. 4, lines 16-28. Seshan further discloses calcining a catalyst at a temperature of up to about 670°C. *See* Seshan, col. 4, lines 26-28. However, Seshan does not disclose any particular atmosphere in which calcinations is conducted; thus, Seshan is understood as teaching calcination in air, rather than in a specific atmosphere such as an inert or oxidizing atmosphere, as discussed above. *See generally*, Seshan. Seshan does not disclose specific embodiments of a catalyst calcined at a temperature of 800°C or more in an inert or oxidizing gas atmosphere, and thus does not disclose, in discrete embodiments, a catalyst comprising: zirconia particles and a transition metal layer in which at least part of a transition metal is solved into said zirconia particles, as recited in independent claims 1 and 11. *See generally*, Seshan.

Moreover, Seshan, like Horiuchi and Montreuil, does not disclose the beneficial effects that can be obtained by the catalytic compositions set forth in claim 1.

Thus, Applicants respectfully submit that claims 1 and its dependent claims 2-10 are patentable over Seshan. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

D. Yoshikawa

The Office Action rejects claims 1-5, 7, 8, 11-15, 19 and 21-23 under 35 U.S.C. §102(e) over U.S. Patent Application Publication No. 2002/0016259 to Yoshikawa. Applicants respectfully traverse this rejection.

Independent claims 1 and 11 are as set forth above. Yoshikawa does not anticipate the claimed invention for the same reasons described above.

Yoshikawa discloses a catalyst composition for exhaust gas purification, including a composite oxide containing zirconium and manganese and/or cobalt with a zeolite. *See*

Yoshikawa, Abstract; paragraph [0017]. Yoshikawa also discloses calcining a catalyst at a temperature of 300-800°C. *See* Yoshikawa, paragraph [0017]. In particular, the disclosed Example of Yoshikawa are calcined at temperatures of 500-700°C. *See* Yoshikawa, paragraph [0036]-[0060]. However, Yoshikawa does not disclose any particular atmosphere in which calcinations is conducted; thus, Yoshikawa is understood as teaching calcination in air, rather than in a specific atmosphere such as an inert or oxidizing atmosphere, as discussed above. *See* generally, Yoshikawa. Yoshikawa does not disclose specific embodiments of a catalyst calcined at a temperature of 800°C or more in an inert or oxidizing gas atmosphere, and thus does not disclose, in discrete embodiments, a catalyst comprising: zirconia particles and a transition metal layer in which at least part of a transition metal is solved into said zirconia particles, as recited in independent claims 1 and 11. *See* generally, Yoshikawa.

Moreover, Yoshikawa, like Horiuchi, Montreuil and Seshan, does not disclose the beneficial effects that can be obtained by the catalytic compositions set forth in claims 1 and 11.

For at least these reasons, Applicants respectfully submit that independent claims 1 and 11, and their dependent claims 2-5, 7, 8, 12-15, 19 and 21-23 are patentable over Yoshikawa. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-25 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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